

INNOLUX DISPLAY CORPORATION

MT170EN01 V.D LCD MODULE SPECIFICATION

-) Preliminary Specification
- () Final Specification

Customer	Checked & Approved by

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Document Number: MT170EN01 V.D-DR4-03

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			Record of Revision
Version	Revise Date	Page	Content
01	2007-09-15	All	First edition to all
			3



SPEC NO. MT170EN01 V.D PAGE 3/24

Contents:	
A. General Specification	
B. Electrical Specifications	
1. Pin assignment	
2. Absolute maximum ratings	
3. Electrical characteristics	
a. Typical operating conditions	
b. Display color v.s. input data signals	
c. Input signal timing	
d. Display position	
e. Backlight driving conditions	
C. Optical specifications	
D. Reliability test items	
E. Safety	
F. Display quality	
G. Handling precaution	
H. Label	
I. Packing form	
J. Mechanical drawings	
Appendix	



SPEC NO. MT170EN01 V.D PAGE 4/24

A. General specification

NO.	Item	Specification	Remark
1	Display resolution (pixel)	1280(H) X 1024(V), SXGA resolution	
2	Active area (mm)	337.92(H) X 270.336(V)	
3	Screen size (inch)	17 inches diagonal	
4	Pixel pitch (mm)	0.264(H) X 0.264(V)	
5	Color configuration	R, G, B vertical stripe	
6	Overall dimension (mm)	358.5(W)x296.5(H)x16(D) (typ)	
7	Weight (g)	2000 (max)	
8	Surface treatment	Anti-glare, Haze = 25%, Hard coating (3H)	
9	Input color signal	8 bit LVDS	
10	Color saturation	72% NTSC	
11	Display colors	16.7M colors (6 bit with Hi-FRC)	
12	Optimum viewing direction	6 o'clock	
13	Backlight	4 CCFL, top & bottom edge side	
14	TCO'03 and RoHS	TCO'03 and RoHS compliance	



MT170EN01 V.D SPEC NO. PAGE 5/24

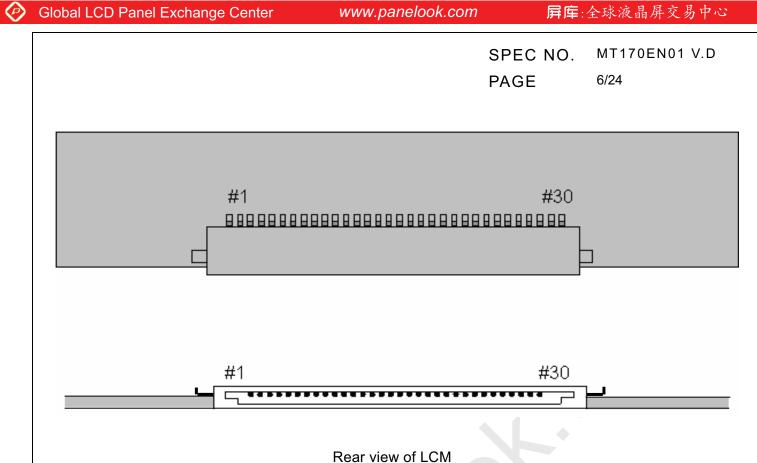
B. Electrical specifications

1.Pin assignment

Connector JAE FI-X30SSL-HF or equivalent

Pin No	Symbol	Description
1	RxO0-	LVDS Differential data input Channel 0(-)
2	RxO0+	LVDS Differential data input Channel 0(+)
3	RxO1-	LVDS Differential data input Channel 1(-)
4	RxO1+	LVDS Differential data input Channel 1(+)
5	RxO2-	LVDS Differential data input Channel 2(-)
6	RxO2+	LVDS Differential data input Channel 2(+)
7	GND	Ground
8	RxOC-	LVDS Differential Clock input (-)
9	RxOC+	LVDS Differential Clock input (+)
10	RxO3-	LVDS Differential data input Channel 3(-)
11	RxO3+	LVDS Differential data input Channel 3(+)
12	RxE0-	LVDS Differential data input Channel 0(-)
13	RxE0+	LVDS Differential data input Channel 0(+)
14	GND	Ground
15	RxE1-	LVDS Differential data input Channel 1(-)
16	RxE1+	LVDS Differential data input Channel 1(+)
17	GND	Ground
18	RxE2-	LVDS Differential data input Channel 2(-)
19	RxE2+	LVDS Differential data input Channel 2(+)
20	RxEC-	LVDS Differential Clock input (-)
21	RxEC+	LVDS Differential Clock input (+)
22	RxE3-	LVDS Differential data input Channel 3(-)
23	RxE3+	LVDS Differential data input Channel 3(+)
24	GND	Ground
25	GND	Ground
26	GND	Ground or Open
27	GND	Ground
28	VCC	Power supply (+5.0V)
29	VCC	Power supply (+5.0V)
30	VCC	Power supply (+5.0V)







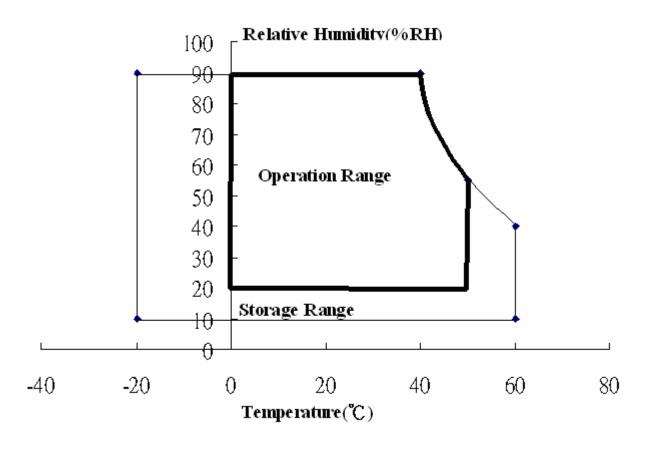
MT170EN01 V.D SPEC NO. 7/24 PAGE

2. Absolute maximum ratings

Parameter	Symbol	Val	ues	Unit	Remark
		Min.	Max.		
Power voltage	V _{cc}	- 0.3	6.0	V	At 25°C
Input signal voltage	V_{LH}	- 0.3	3.6	V	At 25°C
Operating temperature	Тор	0	50	°C	Note 1
Storage temperature	T _{ST}	- 20	60	°C	Note 2
CCFL Current	ICFL	3	8	[mA] rms	

Note 1: The relative humidity must not exceed 90% non-condensing at temperatures of 40°C or less. At temperatures greater than 40°C, the wet bulb temperature must not exceed 39°C.

Note 2: The unit should not be exposed to corrosive chemicals.





MT170EN01 V.D SPEC NO. 8/24 PAGE

3. Electrical characteristics

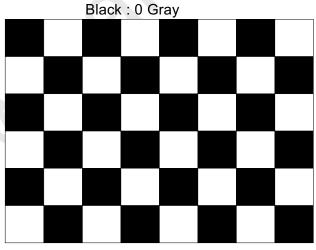
a. Typical operating conditions

	Item	Symbol	Min.	Тур.	Max.	Unit	Remark
	Input Voltage	V_{cc}	4.5	5.0	5.5	٧	
Permiss	sive Power Input Ripple	V_{RF}		-	0.15	Vp-p	Note 1
	Input Current	I _{cc}	-	0.7	0.95	Α	Note 2
Diff	erential Impedance	Z_{m}	90	100	110	ohm	
	Rush Current	I _{Rush}	-		3.0	Α	Note 3
Logic Input	Common Mode Voltage	VCM	1.125	1.25	1.375	V	
Voltage	Differential Input Voltage	VID	250	350	450	mV	
LVDS:	Threshold Voltage (High)	VTH	-		100	mV	Note 4
IN+, IN-	Threshold Voltage (Low)	VTL	-100			mV	Note 4

Note 1: Power input ripple should not exceed max. value.

Note 2: The specified current is under the V_{cc} =5V, 25 °C, f_V =60Hz (frame frequency) condition whereas mosaic pattern (black & white [8*6]) is displayed.

White: 255 Gray

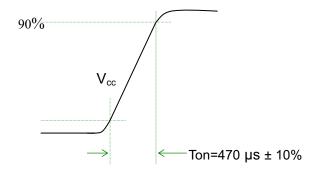


mosaic pattern (black & white [8*6])

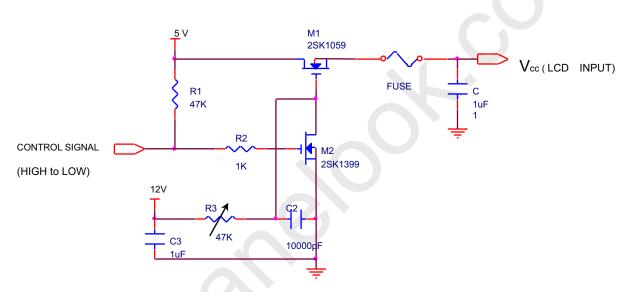
MT170EN01 V.D SPEC NO. 9/24 **PAGE**

Note 3: test condition:

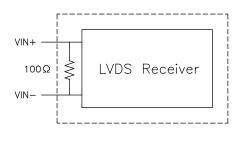
- (1) $V_{cc} = 5 \text{ V}$, V_{cc} rising time = 470 μ s ± 10%
- (2) Pattern: Mosaic pattern

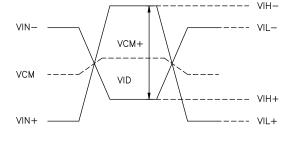


(3) Test circuit



Note 4: LVDS signal definition





 $VID = VIN_{+} - VIN_{-}$

 \triangle VCM = | VCM₊–VCM- | ,

VIN+ = Positive differential DATA & CLK Input VIN- = Negative differential DATA & CLK Input

 \triangle VID = | VID₊–VID- | ,

 $VID+ = |VIH_{+}-VIH_{-}|$

 $VID- = | VIL_+ - VIL_- |$,

 $VCM = (VIN_+ + VIN_-)/2,$

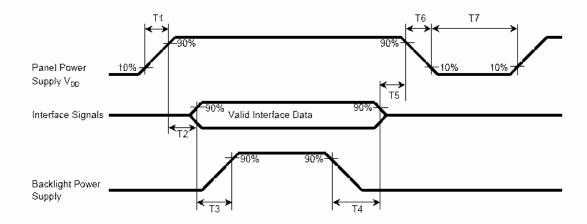
 $VCM+ = (VIH_+ + VIH_-)/2,$

 $VCM- = (VIL_+ + VIL_-)/2,$



SPEC NO. MT170EN01 V.D PAGE 10/24

Note 5 : Power on sequence for LCD $\ensuremath{V_{\text{cc}}}$



Parameter		Unit		
	Min	Тур	Max	ms
T1	0.1		10	ms
T2	0		50	ms
T3	200	250		ms
T4	100	250		ms
T5	0	20	50	ms
Т6	0.1	-		ms
T7	1000	_		ms



SPEC NO. MT170EN01 V.D PAGE 11/24

b. Display color v.s. input data signals

The brightness of each primary color (red, green and blue) is based on the 8-bit gray scale data input for the color; the higher the binary input, the brighter the color. The table below provides a reference for color versus data input.

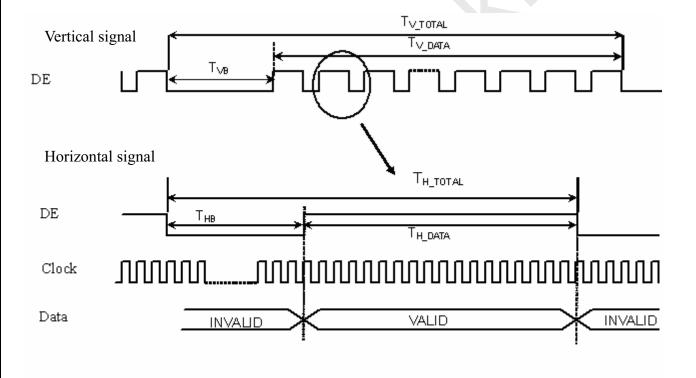
												Inp	ut (colo	or d	lata	l								
	Color	MS	Red MSB				L	SB	Green MSB		en	LSB M		MS	SB	Blue B LS		.SB							
			R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	В7	В6	B5	В4	ВЗ	B2	B1	В0
Basic colors	Black Red(255) Green(255) Blue(255) Cyan Magenta Yellow White	0 1 0 0 0 1 1	0 1 0 0 0 1 1	0 1 0 0 1 1	0 1 0 0 0 1 1	0 1 0 0 0 1 1	0 1 0 0 1 1 1	0 1 0 0 0 1 1	0 1 0 0 1 1	0 0 1 0 1 0 1	0 0 1 0 1 0 1	0 0 1 0 1 0	0 0 1 0 1 0 1	0 0 1 0 1 0 1	0 0 1 0 1 0 1	0 0 1 0 1 0 1	0 0 1 0 1 0 1	0 0 0 1 1 1 0	0 0 1 1 1 0	0 0 1 1 1 0	0 0 1 1 1 0	0 0 1 1 1 0	0 0 0 1 1 1 0	0 0 1 1 1 0	0 0 0 1 1 1 0
Red	Red(000) dark Red(001) Red(002) : Red(253) Red(254) Red(255) bright	0 0 0 : 1 1	0 0 0 : 1 1	0 0 0 : 1 1	0 0 0 : 1 1	0 0 0 : 1 1	0 0 0 : 1 1 1	0 0 1 : 0 1	0 1 0 : 1 0 1	0 0 0 : 0 0	0 0 0 . 0 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0 0	0 0 0 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0
Green	Green(000)dark Green(001) Green(002) : Green(253) Green(254) Green(255)bright	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 0 0	0 0 0 : 1 1	0 0 0 : 1 1	0 0 0 : 1 1	0 0 0 : 1 1	0 0 0 : 1 1	0 0 0 : 1 1	0 0 1 : 0 1	0 1 0 : 1 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0
Blue	Blue(000) dark Blue(001) Blue(002) : Blue(253) Blue(254) Blue(255) bright	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 1 1	0 0 0 : 1 1	0 0 0 : 1 1	0 0 0 : 1 1	0 0 0 : 1 1	0 0 0 : 1 1 1	0 0 1 : 0 1	0 1 0 : 1 0



MT170EN01 V.D SPEC NO. 12/24 PAGE

c. Input signal timing Support Input Timing Table

	Item	Description	Min.	Тур.	Max.	Unit
Clock	Dclk	period	14.71	18.52	22.22	nS
	DCIK	frequency	45	54	68	MHz
Vertical	T_{V_TOTAL}	V total line number	1044	1066	1100	T _{H_TOTAL}
	T_{V_DATA}	Data duration	_	1024	1	T_{H_TOTAL}
	T_VB	V-blank	20	42		T_{H_TOTAL}
	f _V	frequency	50	60	75	Hz
Horizontal	T _{H_TOTAL}	H total pixel number	790	844	880	DClk
	T _{H_DATA}	Data duration	_	640	(+)	DClk
	T _{HB}	H-blank	150	204		DClk



Note: DE is reference signal, DE means the display data valid.



MT170EN01 V.D SPEC NO. **PAGE** 13/24

d. Display Position

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D(1, 1)	D(2, 1)	 D(640, 1)	 D(1279, 1)	D(1280, 1)
D(1, 2)	D(2, 2)	 D(640, 2)	 D(1279, 2)	D(1280, 2)
:		 :	 :	:
D(1, 512)	D(2, 512)	 D(640, 512)	 D(1279, 512)	D(1280, 512)
:		 :	 :	:
D(1, 1023)	D(2, 1023)	 D(640, 1023)	 D(1279, 1023)	D(1280, 1023)
D(1, 1024)	D(2, 1024)	 D(640, 1024)	 D(1279, 1024)	D(1280, 1024)

e. Backlight driving conditions

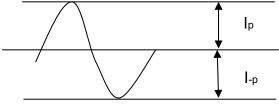
Parameter	Symbol	Min.	Тур.	Max.	Unit	Remark	Remark
Lamp voltage	VL	549	610	671	Vrms	@7mA	
Lamp operation current	IL	3	7	8	mArms	7	Note 1
Lanca de Cara el Cara	\/Letert	1040			Virmo	T = 25°C	Note 2,3,4,5
Lamp starting voltage	VLstart	1360			Vrms	T = 0 ° C	Note 2,3,4,5
Frequency	F	40	55	80	KHZ		Note 5
Lamp life time		50000			Hr		Note 6

Note: The waveform of the voltage output of inverter must be area-symmetric and the design of the inverter must have specifications for the modularized lamp. The performance of the Backlight, such as lifetime or brightness, is greatly influenced by the characteristics of the DC-AC inverter for the lamp. All the parameters of an inverter should be carefully designed to avoid producing too much current leakage from high voltage output of the inverter. When designing or ordering the inverter please make sure that a poor lighting caused by the mismatch of the Backlight and the inverter (miss-lighting, flicker, etc.) never occurs. If the above situation is confirmed, the module should be operated in the same manners when it is installed in your instrument.

Note 1:

The degrees of unbalance: less than 10%

The ratio of wave height: less than $\sqrt{2 \pm 10\%}$



The degrees of umbalance = $|I_p-I_{-p}|$ /Irms *100(%)

The ratio of wave height = Ip(or I-p)/Irms

Lamp should be completely turned on.

Ip: high side

I-p: low side



SPEC NO. MT170EN01 V.D

PAGE 14/24

Note 2:

Test equipment: AS-114B, Output Capacitor =15pF, f=46KHz

Note 3:

The voltage shown above should be applied to the lamp for more than 1 second after startup. Otherwise, the lamp may not be turned on normally.

Note 4:

Inverter should provide more than min. value, and then lamp could be completely turned on

Note 5:

Lamp frequency may produce interference with horizontal synchronous frequency and this may cause line flow on the display. Therefore lamp frequency shall be detached from the horizontal synchronous frequency and its harmonics as far as possible in order to avoid interference.

Note 6:

Lamp life definition:

The brightness of lamp becomes 50% of the initial brightness or not normal lighting.

Backlight connecter: 35001HS-02L

Pin no.	Symbol	Function	Remark
1	VIH	Lamp high voltage input	Cable color: Pink · Blue
2	VIL	Lamp low voltage input	Cable color: White · Black

MT170EN01 V.D SPEC NO. 15/24 PAGE

C. Optical specifications

	Symbol	Condition	Specification				
Item			Min.	Тур.	Max.	Unit	Remark
	Tr			1	4	ms	Note 4
Response time	Tf	θ= 0°		4	6		
	Tr+Tf			5	10		
Contrast ratio	CR	θ= 0°	600	800			Note 3,5
	Ton	CR≧10	70	80			
	Тор	CR≧5	75	85			Note 3,5,7
		CR≧10	70	80			
	Bottom	CR≧5	75	85			
Viewing angle	Left	CR≧10	70	80			
		CR≧5	75	85			
	Right	CR≧10	70	80			
		CR≧5	75	85			
Brightness (Center)	YL		200	250		nit	Note 3,6
	Wx		-0.03	0.313			Note 3
	Wy			0.329			
	Rx			0.640		+0.03	
	Rv			0.349	+0.03		
Color chromaticity(CIE)	Gx	θ= 0°		0.284			
4	Gv			0.617			
	Вх			0.142			
	By			0.067			
White uniformity (9)	δ_{W}		0.75	0.8			Note 3,8
Cross talk	Ct				2%		Note 9

Note 1: Ambient temperature = 25°C.

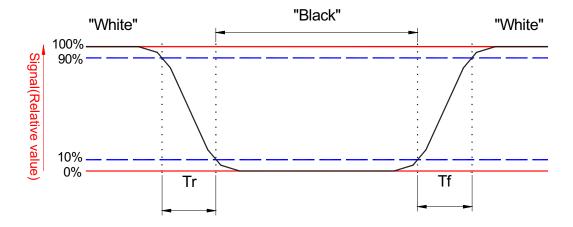
Note 2: To be measured in dark room after backlight warm up 30 minutes.

Note 3: To be measured with a viewing cone of 2°by Topcon luminance meter BM-5A.

Note 4: Definition of response time:

The output signals of BM-7 are measured when the input signals are changed from "Black" to "White" (falling time) and from "White" to "Black" (rising time), respectively. The response time interval between the 10% and 90% of amplitudes. Refer to figure as below.



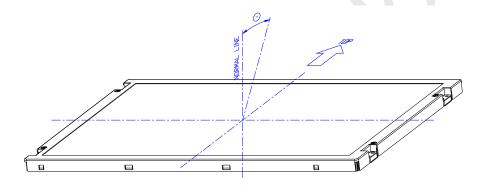


Note 5. Definition of contrast ratio:

Contrast ratio is calculated with the following formula.

Note 6: Driving conditions for CCFL: I_L= 7.0 mA, 50 KHz Frequency.

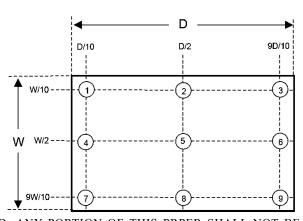
Note 7: Definition of viewing angle



Note 8: Definition white uniformity:

Luminance are measured at the following nine points (1~9).

$$\delta_{W} = \frac{\text{Minimum Brightness of nine points}}{\text{Maximum Brightness of nine points}}$$

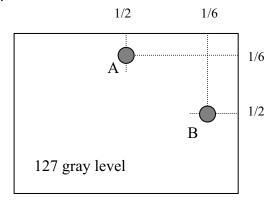


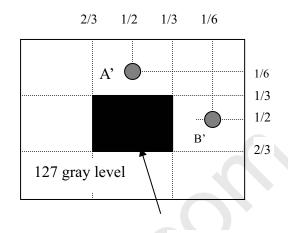
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MT170EN01 V.D SPEC NO. PAGE 17/24

Note 9:





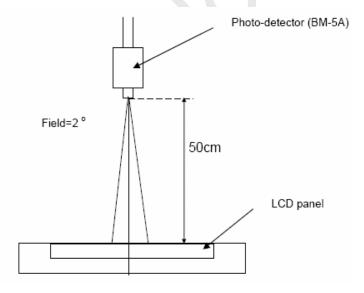
0 gray level

Unit: percentage of dimension of display area

I L_A - L_A · I / L_A x 100%= 2% max., L_A and L_A · are brightness at location A and A'

 $IL_B-L_{B'}I/L_B \times 100\% = 2\%$ max., $L_{B'}$ and $L_{B'}$ are brightness at location B and B'

Note 10: Optical characteristic measurement setup



MT170EN01 V.D SPEC NO. PAGE 18/24

D. Reliability test items

Test Item	Test Condition	Judgement	Remark
High temperature storage	60°C, 240Hrs	Note 1	Note 2
Low temperature storage	-20°C, 240Hrs	Note 1	Note 2
High temperature & high	40°C, 90%RH,240Hrs	Note 1	Note 2
humidity operation	(No condensation)		
High temperature operation	50°C, 240Hrs	Note 1	Note 2
Low temperature operation	0°C, 240Hrs	Note 1	Note 2
Thermal Shock	-20°C~60°C	Note 1	Note 2
(non-operation)	1Hr, 10mins, 1Hr, 100cycles		
Electrostatic discharge (ESD)	Contact: +/-8kV, 150pF(330ohms),	No te 1	Note 2
(non-operation)	10 times/1 point, 1 time/1 sec		
	Air discharge: +/-15kV, 150pF(330ohms),		
	10 times/1 point, 1 time/1 sec		
Vibration	Vibration level : 1G	Note 1	Note 2
(non-operation)	Bandwidth : 10-500Hz		
	Waveform : sine wave,		
	sweep rate : 30min		
	1H for each direction X, Y, Z		
	(3Hrs in total)		
Mechanical shock	Shock level : 50G/11ms,	Note 1	Note 2
(non-operation)	Waveform : Half sine wave		
	Direction: ±X, ±Y, ±Z		
	once for each direction		
MTBF Demonstration	50,000 hours with confidence level 90%	Note 1	Note 3

Note 1:

Pass: Normal display image with no obvious non-uniformity and no line defect. Partial transformation of the module parts should be ignored.

Fail: No display image, obvious non-uniformity, or line defects.

Note 2:

Evaluation should be tested after storage at room temperature for one hour.

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Note 3:

The MTBF (Exclude CCFL) calculation is based on the assumption that the failure rate distribution meets the Exponential Model.

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MT170EN01 V.D SPEC NO. PAGE 19/24

E. Safety

(1) Sharp Edge Requirements

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There will be no sharp edges or corners on the display assembly that could cause injury.

(2) Materials

a. Toxicity

There will be no carcinogenic materials used anywhere in the display module. If toxic materials are used, they will be reviewed and approved by the responsible InnoLux Toxicologist.

b. Flammability

All components including electrical components that do not meet the flammability grade UL94-V1 in the module will complete the flammability rating exception approval process. The printed circuit board will be made from material rated 94-V1 or better. The actual UL flammability rating will be printed on the printed circuit board.

C. Capacitors

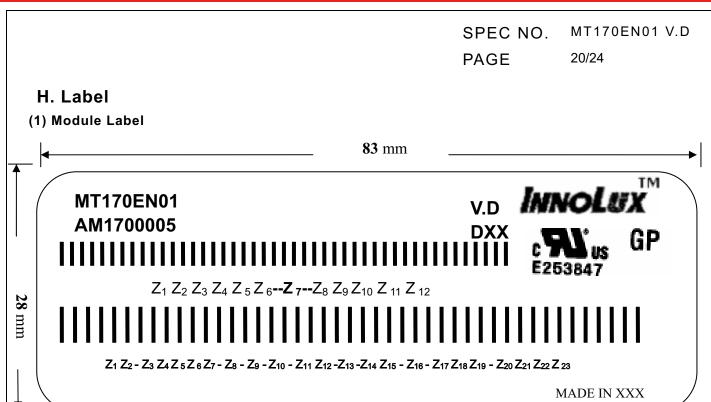
If any polarized capacitors are used in the display assembly, provisions will be made to keep them from being inserted backwards.

F. Display quality

The display quality of the color TFT-LCD module should be in compliance with the Innolux's Incoming inspection standard.

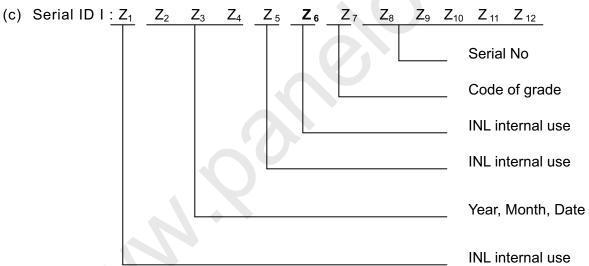
G. Handling precaution

The Handling of the TFT-LCD should be in compliance with the Innolux's handling principle standard.



(a) Model Number: MT170EN01

(b) Version: V.D

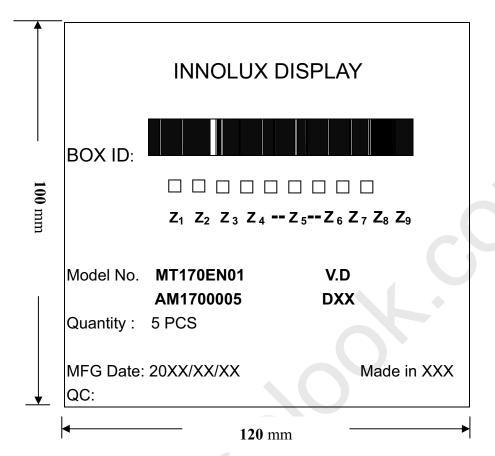


Serial ID includes the information as below:

- Manufactured Date: Year: 0~9, for 2000~2009.
- 2. Month: 1~9 & A~C for Jan.~Dec.
- Date: 1~9 & A~Z (exclude I, O, Q, U) for 1th~31th. 3.
- Code of grade: 1, 2,3, 5, 7, E
- Serial No: Module manufacture sequential number.
- (e) Serial ID II (INL internal use)

MT170EN01 V.D SPEC NO. **PAGE** 21/24

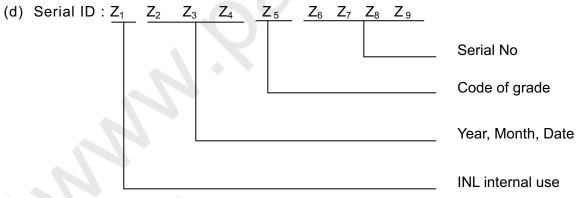
(2) Carton Label



(a) Model Number: MT170EN01

(b) Version: V.D

(c) Packing quantity: 5 PCS



Serial ID includes the information as below:

(a) Manufactured Date: Year: 0~9, for 2000~2009

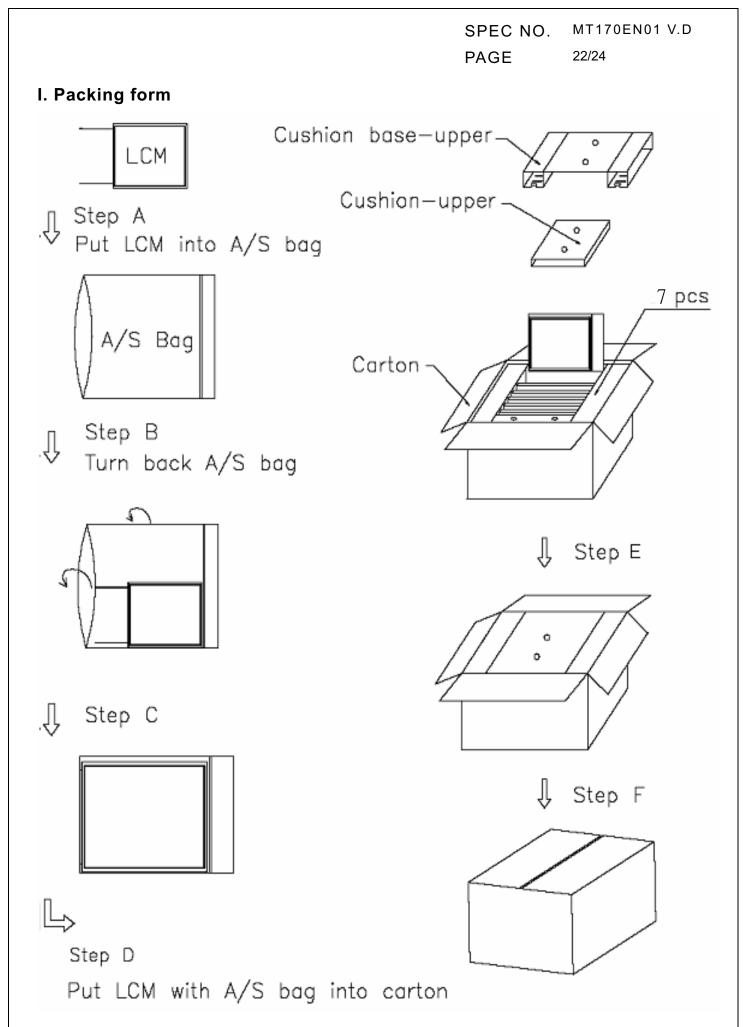
Month: 1~9 & A~C for Jan.~Dec.

Date: 1~9 & A~Z (exclude I, O, Q, U) for 1th~31th

(b) Code of grade: 1, 3, 5, 7, E

(c) Serial No: Module packing sequential number.





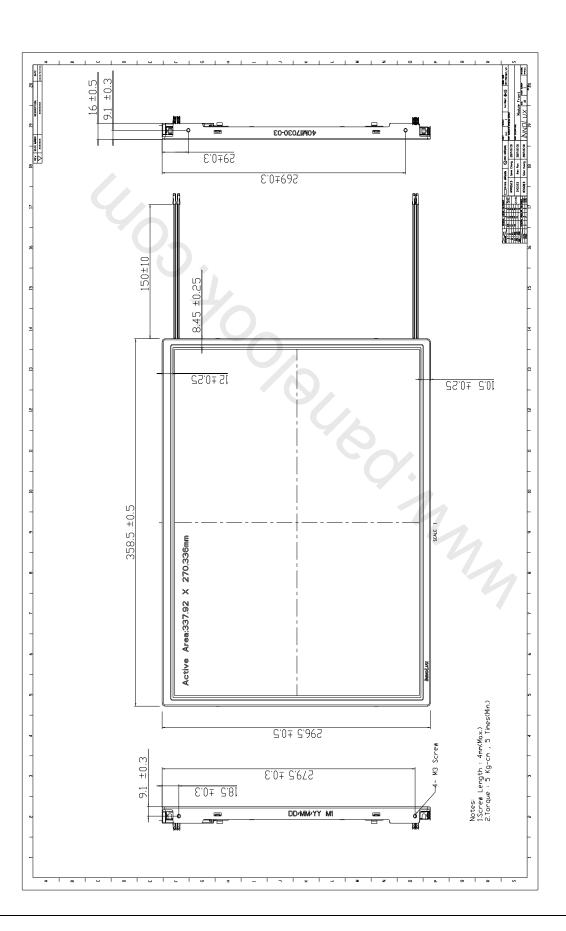
MT170EN01 V.D

SPEC NO.

23/24

PAGE

1. Front View

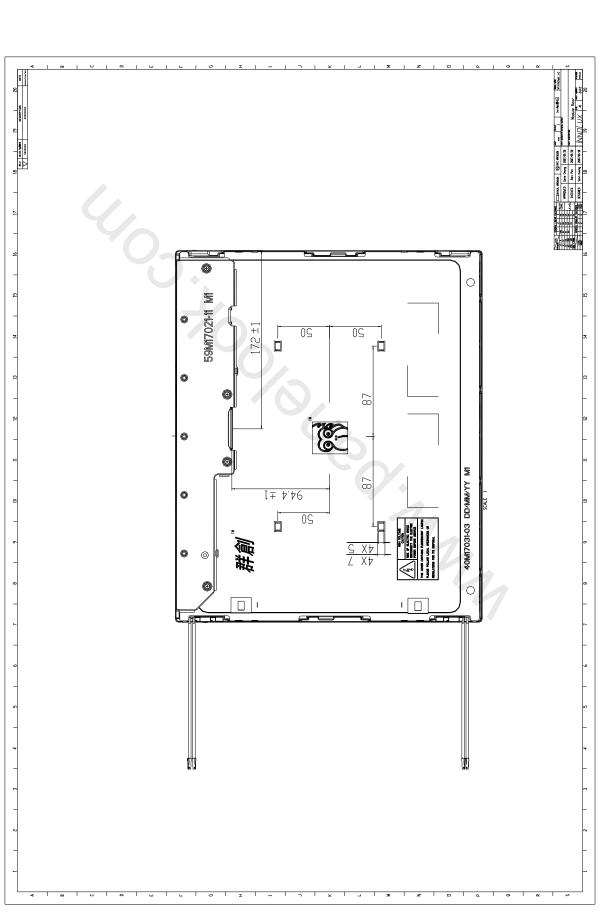






屏庫:全球液晶屏交易中心

2. Back View



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